10(4), 10(7)

AUTHOR: Didenko, A. N.

SOV/56-35-3-15/61

TITLE: Interaction Between a Charged Current-Carrying Jet Moving in a Circle and a Magnetodielectric (Vzaimodeystviye mezhdu dvizhushcheysya po okruzhnosti saryazhennoy struyey s tokom i magnitodielektrikom)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 3, pp 655 - 661 (USSR)

ABSTRACT: Morozov (Ref 1) for the first time investigated the interaction between a charged current-carrying jet moving with high velocity and a magnetodielectric; in this case a jet moving in a straight line was assumed, the "trajectories" of which were planes (use of plane Cartesian coordinates, assumption that the entire space consist of layers that are parallel to the same and are filled with media of various ε and μ). If the jets move in a circle, these "trajectories" are cylinder jackets; the coaxially arranged cylinders divide the space into domains which are filled with media of different ε and μ. First, the motion in a homogeneous

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space is investigated, and the three different cases of motion in an inhomogeneous space: 1) Motion of the current-carrying jet on a circle (radius a) within a cylinder having a radius of $a_1 (a < a_1)$ with ε_1 and μ_1, outside the cylinder a medium with ε_2 and μ_2; 2) The radius of the motion performed by the jet extends into the medium $2(\varepsilon_2, \mu_2)$, the space of the cylinder filled with the magnetodielectric medium (a_1) is located on the outside; $(a_1 < a)$; 3) As in case 2), but outside the jet motion there is a further cylindrical boundary surface against medium 3(with $\varepsilon_{1,3}$ and $\mu_{1,3}$); $(a_1 < a < a_2)$.

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For these cases the radiation spectra and lateral forces caused by the magnetodielectric are investigated. The author uses the Bessel- and Neumann (Neyman) functions for his work, which make it possible to obtain good approximate solutions also for comparatively low values of indices and arguments. There are 2 figures and 9 references, **all** of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet (Moscow State University)

SUBMITTED: January 18, 1958 (initially) and May 22, 1958 (after revision)

Card 3/3

AUTHOR: Didenko, A.N. SOV/109-59-4-2-3/27

TITLE: Propagation of Electromagnetic Waves in Loaded Bent Waveguides (Rasprostraneniye elektromagnitnykh voln v izognutykh nagruzhennykh volnovodakh)

PERIODICAL: Radiotekhnika i Elektronika, 1959, Vol 4, Nr 2, pp 172-180 (USSR)

ABSTRACT: The types of the waveguide considered are shown diagrammatically in the figure on page 173. All the waveguides (6 types) consist of two coaxial cylinders having radii r_1 and r_2. Electromagnetic waves propagate in the azimuthal direction in the narrow annular space between the two cylinders. The waveguides can, therefore, be considered not as bent loaded waveguides but as slow-wave systems in which the waves propagate along the co-ordinate φ. The waveguides can be loaded either with a dielectric (the first 3 types) or with metallic ribs (the last 3 types). Only the first, symmetrically loaded, waveguide which is partially filled with a dielectric having a permittivity $\varepsilon \gg 1$ is analysed. The results obtained can be extended to the remaining types of the waveguide. The solution of the problem is found under

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Propagation of Electromagnetic Waves in Loaded Bent Waveguides

the following assumptions: (1) the waveguides are not limited in the direction of the axis z; (2) the fields are uniform as a function of z; (3) only one wave propagates in the interaction space; (4) only the principal mode is excited in the resonator space and (5) the fields are sinusoidal functions of time. The Maxwell equations for the system can be written as Eq (1) and (2). The solutions for the field components of Eq (1) are in the form of Eq (3) where k_φ is the φ-th component of the wave vector. By combining Eq (3) and (1) it is possible to obtain Eq (4) and (5). The solution of these is in the form of

$$H_z(r,\varphi,t) = \left[AJ_{k_\varphi}(\sqrt{\varepsilon\mu}kr) + BN_{k_\varphi}(\sqrt{\varepsilon\mu}kr)\right] P$$

$$E_\varphi(r,\varphi,t) = i\sqrt{\frac{\mu}{\varepsilon}}\left[AJ'_{k_\varphi}(\sqrt{\varepsilon\mu}kr) + BN'_{k_\varphi}(\sqrt{\varepsilon\mu}kr)\right]P \quad (6)$$

where $P = \exp\left[i(\omega t - k\varphi)\right]$, while J and N are Bessel and Neuman functions respectively. By using the boundary

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conditions at $r = r_0 \pm (a + h)$, where $r_0 = \frac{r1 + r2}{2}$ and h is the thickness of the dielectric layer, the constants A and B of Eq (6) can be found from Eq (7). Similarly, for the interaction space the fields are given by Eq (8), the ratio C'/D' can be obtained from Eq (8) by assuming that the tangential field components at $r = r_0 \pm a$ are equal. If $kr_{1,2} \gg 1$ and $k_\varphi < kr_{1,2}$, the Bessel and Neuman functions are given by Expression (9), while Eq (7) is in the form of Eq (10), where x - is given by the first equation on page 176. The scattering equation of the system is, therefore, given by Eq (11). The electromagnetic field components can be expressed by Eq (13). On the other hand, if $kr_{1,2} \gg 1$ and $kr_{1,2} \sim k_\varphi$, the Bessel and Neuman functions can be expressed by Eq (14) and (15). The asymptotic expressions for these functions are in the form of Eq (14a) and (15a). The field components are, therefore, given by Eq (16) and (17) and the expression for determining the quantity C/D is in the form of Eq (18). On the basis of this equation, it is possible to derive the scattering equation of the system and the

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expressions for the field components in the interaction space; the parameter z_0 in Eq (18) is defined as $z_0 = \frac{k\varphi}{3}(\frac{2a}{r_0})^{3/2}$. If z is such that only the first two terms of the series for the Bessel functions are used, Eq (18) can be written as Eq (19). The scattering equation for a symmetrically loaded waveguide, which is partially filled with dielectric, is then in the form of Eq (20). Similarly, for a rib-loaded waveguide, the scattering equation is in the form of Eq (21). If $z_0 \gg 1$, the scattering equation is given by Eq (24) and the ratio C/D is expressed by Eq (25). By comparing the above calculated results, it is found that, from the point of view of employing a waveguide as a particle accelerator, a dielectric-loaded waveguide is more

SOV/109-59-4-2-3/27

Propagation of Electromagnetic Waves in Loaded Bent Waveguides

efficient than the rib-loaded waveguide, proved $\varepsilon > 10$. There is 1 figure and 5 Soviet references.

ASSOCIATION: Fizicheskiy Fakul'tet Moskovskogo Gosudarstvennogo Universiteta im. M.V.Lomonosova (Physics Department of the Moscow State University imeni M.V.Lomonosov)

SUBMITTED: 20th July 1957

Card 5/5

81747
S/089/60/008/05/07/008
B006/B056

21.2100

AUTHORS: Vorob'yev, A. A., Didenko, A. N., Kovalenko, Ye. S.

TITLE: Acceleration of Electrons in a Circular Traveling-wave Accelerator 19

PERIODICAL: Atomnaya energiya, 1960, Vol. 8, No. 5, pp. 459 - 461

TEXT: The suggestion to use a closed circular curved waveguide (the cross section of which is shown on p. 459) as accelerator system was made by Vorob'yev (Ref. 1); in this waveguide an electromagnetic wave with a non-vanishing φ-component of the electric field propagates. The charge of the waveguide is such that within the range of the mean radius the phase velocity of the wave is $v_{ph} = c$. The propagation of the waves in curved waveguides which are unlimited in the axial direction have already been investigated in an earlier paper (Ref. 2). Proceeding from the results then obtained, the authors in the present paper investigated the possibilities of a control of the particle trajectories by the wave field itself. From the results obtained in Ref. 2 the

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conclusion may be drawn that 1) the curvature of the waveguide reduces the phase velocity of the cophasal waves, and 2) that the influence exerted by the curvature upon the dispersion properties of a system closed in the axial direction is at $v_{ph} = c$ considerably greater than in an axially not closed system. These results are discussed. Several questions relating to the selection of the waveguide parameters are briefly discussed. Contrary to an ordinary synchrotron, the high frequency field in this waveguide accelerator is highly inhomogeneous in axial and radial direction (all components depend in a complex manner on r and z). The dynamics of the particles in the cyclic waveguide accelerator is, however, similar to those in a cyclotron, and the complex wave field does not disturb the normal operation of the accelerator. The suggestions for the control of particle trajectories in the curved waveguide by means of the traveling wave field, which had been made by Vorob'yev already in Ref. 6, are finally discussed (stability conditions - equation (5)). These possibilities of trajectory control by the traveling wave field as well as the possibility of avoiding some technical difficulties occurring in the construction of cyclic

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Acceleration of Electrons in a Circular Traveling-wave Accelerator

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high-energy electron accelerators make the use of curved waveguides in cyclic accelerators interesting. There are 1 figure and 6 Soviet references.

SUBMITTED: March 9, 1959

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26.2340
21.2000 (2217,1138,1565)

S/089/61/010/001/011/020
B006/B063

AUTHORS: Didenko, A. N., Kovalenko, Ye. S.

TITLE: Effectiveness of a Waveguide as the Accelerating System of an Electron Synchrotron

PERIODICAL: Atomnaya energiya, 1960, Vol. 10, No. 1, pp. 69-71

TEXT: This "Letter to the Editor" follows a previous paper which reported on the possibility of using waveguides as accelerating systems in electron synchrotrons. With a view to estimate the effectiveness of this possibility, the authors consider a closed waveguide provided with a diaphragm, in which the wave LE_{11} propagates in azimuthal direction. The phase and group velocities of the wave, its damping α, and the coupling resistance R_c are studied. These parameters along with the quality factor Q determine the shunt resistance R_{sh} which is taken as a measure for the effectiveness of the h-f system. The calculation of these quantities was facilitated by neglecting the spatial harmonics and the effect

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of curvature upon the field structure in the waveguide cross section. Next, explicit formulas are given for these parameters without derivation. Fig. 1 shows α, Q, R_c, v_{gr}, and r_{sh} as functions of λ for $v_{ph} = c$, $2g = 6$cm, a = 5.85 cm, and $D = \lambda/4$ (period of the system). Fig. 2 illustrates the dependence of R_c, r_{sh}, and v_{gr} on 2g (for $\lambda = 9.3$ cm). $r_{sh} = \frac{4\pi}{\lambda} R_c Q v_{gr}/c$ is the shunt resistance per unit length of the accelerator; $Q = \omega/2\alpha v_{gr}$; ω is the cyclic frequency. $R_{sh} = 4\pi m R_c Q_{eff} v_{gr}/c$, where Q_{eff} is the effective quality factor of the waveguide, with all losses being taken into account. Finally, a comparison is made between a h-f system in the form of a closed waveguide with a diaphragm and one of the best and most up-to-date resonator systems. For $R_c = 50$ ohms, $Q_{eff} = 10^4$, and $v_{gr} = 0.1c$, the application of a waveguide like the one used in the German 6-Bev synchrotron DESY, $\lambda = 10$ cm would entail a shunt resistance of 2000 megohms. This would be impossible with the use of a conventional resonator. Professor A. A. Vorob'yev is thanked for interest and discussions. There are 3 figures and 3 references: 2 Soviet and 1 CERN.

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29314
S/109/61/006/010/012/027
D201/D302

AUTHORS: Didenko, A.N., and Bezmaternykh, L.N.

TITLE: Design of rectangular waveguides loaded by dielectric diaphragms

PERIODICAL: Radiotekhnika i elektronika, v. 6, no. 10, 1961, 1670 - 1676

TEXT: In the present article, the authors give the basic theory of rectangular waveguides loaded by dielectric diaphragms. The analyzed system is the rectangular waveguide of height a and width b, which has at its interval walls dielectric diaphragms of thickness L_2 and height h, spaced by a distance L_1 from each other. The diaphragms are made of isotropic dielectric with large ε. The dispersion equations are obtained for the waves, existing in the given system. In the absence of central irises in the dielectric and it is known that if the fields depend on both transversal coordinates only hybrid waves are possible. It is necessary, therefore, to obtain dispersion equations for TE- and TM-waves simultaneously

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which exist in waveguides with solid diaphragms. For thin and closely spaced diaphragms ($P_1 L_1 \ll 1$, $P_2 L_2 \ll 1$)

$$\left(\frac{\pi}{a}\right)^2 + (\Gamma^e)^2 = \frac{\varepsilon(L_1 + L_2)}{\varepsilon L_1 + L_2} k^2 - \frac{\varepsilon(L_1 + L_2)^2}{(L_1 + \varepsilon L_2)(\varepsilon L_1 + L_2)} k_3^2, \quad (3)$$

and

$$\left(\frac{\pi}{a}\right)^2 + (\Gamma^m)^2 = \frac{\varepsilon(L_1 + L_2)}{\varepsilon L_1 + L_2} k^2 - \frac{L_1 + L_2}{L_1 + \varepsilon L_2} k_3^2 \quad (4)$$

are obtained, where

$$k_3 = \frac{\omega}{v_\phi} = \frac{2\pi}{\lambda_g}; \quad L = L_1 + L_2; \quad p_1^2 = k^2 - \Gamma^2 - \left(\frac{\pi}{a}\right)^2; \quad p_2^2 = \varepsilon k^2 - \Gamma^2 - \left(\frac{\pi}{a}\right)^2$$

and Γ^e and Γ^m - the transverse wave numbers for the TM- and TE waves in the y-direction. The TM- and TE- wave components are obtained in the same manner. When the waveguide is filled by dielectric having central irises, one TE- or one TM-wave only can no longer satisfy the boundary conditions and only hybrid waves are possible. Their field components may be determined from the electric and magnetic Hertzian vectors

$$\vec{E} = \text{grad div } \vec{\Pi}_e - \Delta \vec{\Pi}_e + ik \text{ rot } \vec{\Pi}_m \qquad (5)$$

and

$$\vec{H} = - i\varepsilon k \text{ rot } \vec{\Pi}_e + \text{grad div } \vec{\Pi}_m - \quad \vec{\Pi}_m \qquad (6)$$

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and assuming that, as usual, vectors $\vec{\Pi}_e$ and $\vec{\Pi}_m$ have only the Z-components the following expressions are obtained for the components of the in phase hybrid wave within the interaction region $(0 \leqslant /y/ \leqslant /\frac{b}{2} - h/)$

$$E_x = \sin \frac{\pi}{a} x \sum_{s=-\infty}^{\infty} \text{ch } k_{y,s} y \left(- i\beta_s Q_s^{(1)} A_s + Q_s^{(2)} B_s\right) e^{i\beta_s z},$$

$$E_y = \cos \frac{\pi}{a} x \sum_{s=-\infty}^{\infty} \text{sh } k_{y,s} y \left(i\beta_s Q_s^{(3)} A_s - Q_s^{(4)} B_s\right) e^{i\beta_s z}, \qquad (7)$$

$$E_z = \cos\frac{\pi}{2}x\sum_{s=-\infty}^{\infty}\operatorname{ch} k_{y,s}yA_s e^{i\beta_s z},$$

$$H_x = \cos\frac{\pi}{a}x\sum_{s=-\infty}^{\infty}\operatorname{sh} k_{y,s}y\left(-Q_s^{(2)}A_s + i\beta_s Q_s^{(1)}B_s\right)e^{i\beta_s z}$$

$$H_y = \sin\frac{\pi}{a}x\sum_{s=-\infty}^{\infty}\operatorname{ch} k_{y,s}y\left(-Q_s^{(4)}A_s + i\beta_s Q_s^{(3)}B_s\right)e^{i\beta_s z},$$

$$H_z = \sin\frac{\pi}{a}x\sum_{s=-\infty}^{\infty}\operatorname{sh} k_{y,s}y\,B_s e^{i\beta_s z}.$$

where

$$Q_s^{(1)} = \frac{\frac{\pi}{a}}{\left(\frac{\pi}{a}\right)^2 - k_{y,s}^2};\quad Q_s^{(2)} = \frac{ikk_{y,s}}{\left(\frac{\pi}{a}\right)^2 - k_{y,s}^2};$$

$$Q_s^{(3)} = \frac{k_{y,s}}{\left(\frac{\pi}{a}\right)^2 - k_{y,s}^2};\quad Q_s^{(4)} = \frac{ik\frac{\pi}{a}}{\left(\frac{\pi}{a}\right)^2 - k_{y,s}^2}; \tag{8}$$

$$-k_{y,s}^2 = k^2 - \beta_s^2 - \left(\frac{\pi}{a}\right)^2;$$

and β_s - propagation constant of the S-th space harmonic related to the fundamental by $\beta_s = \beta_0 + \frac{2\pi s}{L}$. For the other region $(/\frac{b}{2} - h/ \leqslant /y/ \leqslant /\frac{b}{2}/)$ the hybrid field components are expressed by

$$E_x = \sin\frac{\pi}{a}x \sum_{s=-\infty}^{\infty} e^{i\beta_s z} \sum_{r=-\infty}^{\infty} \Big[- R_r^{e\,(1)} a_r \operatorname{sh} \Gamma_r^e \left(y - \frac{b}{2}\right) T_{r,s}^e + R_r^{m\,(2)} b_r \operatorname{sh} \Gamma_r^m \left(y - \frac{b}{2}\right) S_{r,s}^m\Big],$$

$$E_y = \cos\frac{\pi}{a}x \sum_{s=-\infty}^{\infty} e^{i\beta_s z} \sum_{r=-\infty}^{\infty} \Big[R_r^{e\,(3)} a_r \operatorname{ch} \Gamma_r^e \left(y - \frac{b}{2}\right) T_{r,s}^e - R_r^{m\,(4)} b_r \operatorname{ch} \Gamma_r^m \left(y - \frac{b}{2}\right) S_{r,s}^m\Big], \quad (16)$$

$$E_z = \cos\frac{\pi}{a}x \sum_{s=-\infty}^{\infty} e^{i\beta_s z} \sum_{r=-\infty}^{\infty} a_r \operatorname{sh} \Gamma_r^e \left(y - \frac{b}{2}\right) S_{r,s}^e,$$

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$$H_x = \cos\frac{\pi}{a}x \sum_{s=-\infty}^{\infty} e^{i\beta_s z} \sum_{r=-\infty}^{\infty} \Big[-R_r^{e\,(2)} a_r \operatorname{ch} \Gamma_r^e \Big(y-\frac{b}{2}\Big)\widetilde{S}_{r,s}^e + R_r^{m\,(1)} b_r \operatorname{ch} \Gamma_r^m \Big(y-\frac{b}{2}\Big) T_{r,s}^m\Big],$$

$$H_y = \sin\frac{\pi}{a}x \sum_{s=-\infty}^{\infty} e^{i\beta_s z} \sum_{r=-\infty}^{\infty} \Big[-R_r^{e\,(4)} a_r \operatorname{sh} \Gamma_s^e \Big(y-\frac{b}{2}\Big)\widetilde{S}_{r,s}^e + R_r^{m\,(3)} b_r \operatorname{sh} \Gamma_r^m \Big(y-\frac{b}{2}\Big) T_{r,s}^m\Big], \qquad (16)$$

$$H_z = \sin\frac{\pi}{a}x \sum_{s=-\infty}^{\infty} e^{i\beta_s z} \sum_{r=-\infty}^{\infty} b_r \operatorname{ch} \Gamma_r^m \Big(y-\frac{b}{2}\Big) S_{r,s}^m,$$

in which

$$S_{r,s}^e = \frac{1}{L}\int_0^L e^{-i\beta_s z} W_r^e(z)\,dz = \frac{1}{L}\big(S_{r,s}^{e\,(1)} + S_{r,s}^{e\,(2)}\big); \qquad (17)$$

$$\widetilde{S}_{r,s}^e = \frac{1}{L}\int_0^L \varepsilon e^{-i\beta_s z} W_r^e(z)\,dz = \frac{1}{L}\big(S_{r,s}^{e\,(1)} + \varepsilon S_{r,s}^{e\,(2)}\big); \qquad (18)$$

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$$T^e_{r,s} = \frac{1}{L}\int_0^L e^{-i\beta_s z}\frac{dW^e_r(z)}{dz}\,dz = \frac{1}{L}\left(T^{e(1)}_{r,s} + T^{e(2)}_{r,s}\right); \quad (19) \qquad (19)$$

$$S^{e(1)}_{r,s} = -\frac{1}{p_1^2-\beta_s^2}\left\{e^{-i\beta_s L_1}\left[i\beta_s W^e_r(L_1) + \frac{dW^e_r(L_1)}{dz}\right] - \left[i\beta_s W^e_r(0) + \frac{dW^e_r(0)}{dz}\right]\right\}; \quad (20) \qquad (20)$$

$$S^{e(2)}_{r,s} = -\frac{1}{p_2^2-\beta_s^2}\left\{e^{-i\beta_s L}\left[i\beta_s W^e_r(L) + \frac{dW^e_r(L)}{dz}\right] - e^{-i\beta_s L_1}\left[i\beta_s W^e_r(L_1) + \frac{dW^e_r(L_1)}{dz}\right]\right\}; \quad (21) \qquad (21)$$

$$T^{e(1)}_{r,s} = -\frac{1}{p_1^2-\beta_s^2}\left\{e^{-i\beta_s L_1}\left[i\beta_s \frac{dW^e_r(L_1)}{dz} - p_1^2 W^e_r(L_1)\right] - \left[i\beta_s \frac{dW^e_r(0)}{dz} - p_1^2 W^e_r(0)\right]\right\}; \quad (22) \qquad (22)$$

$$T^{e(2)}_{r,s} = -\frac{1}{p_2^2-\beta_s^2}\left\{e^{-i\beta_s L}\left[i\beta_s \frac{dW^e_r(L)}{dz} - p_1^2 W^e_r(L)\right] - e^{-i\beta_s L_1}\left[i\beta_s \frac{dW^e_r(L_1)}{dz} - p_1^2 W^e_r(L_1)\right]\right\}. \qquad (23)$$

By equating the respective harmonics of tangential components of (7) and (16) and disposing of A_s and B_s the following two infinite systems of linear equations with respect to a_r and b_r, are obtained determining the dispersion properties of the in-phase wave of the waveguide with dielectric diaphragms

$$\begin{aligned}&\sum_{r=-\infty}^{\infty} a_r [Q_s^{(2)} S_{r,s}^e \operatorname{th} k_{y,s} y_0 \operatorname{sh} \Gamma_r^e h + R_{r,}^{e\,(2)} \mathfrak{T}_{r,s}^e \operatorname{ch} \Gamma_r^e h] + \\ &+ b_r [i\beta_s Q_s^{(1)} S_{r,s}^m \operatorname{ch} \Gamma_r^m h - R_r^{m\,(1)} T_{r,s}^m \operatorname{ch} \Gamma_r^m h] = 0, \\ &\sum_{r=-\infty}^{\infty} a_r [i\beta_s Q_s^{(1)} S_{r,s}^e \operatorname{sh} \Gamma_r^e h - R_r^{e\,(1)} T_{r,s}^e \operatorname{sh} \Gamma_r^e h] + \\ &+ b_r [Q_s^{(2)} S_{r,s}^m \operatorname{cth} k_{y,s} y_0 \operatorname{ch} \Gamma_r^m h + R_r^{m\,(2)} S_{r,s}^m \operatorname{sh} \Gamma_r^m h] = 0.\end{aligned} \qquad (24)$$

in which $-\infty \leqslant S \leqslant +\infty$. The analysis of Eq. (24) is rather difficult. The approximate equations are, therefore, of interest. They can be obtained assuming that the field distribution in the second region is adequately described by functions W_o^e and W_-^m and by their derivatives. Then the higher space harmonics can be evaluated by the approximate method of lacing together partial powers. The method consists of evaluating partial powers for the I and II region over one period L of the structure and adding them at the boundary

$$p_1^{I} = p_1^{II}, \quad p_2^{I} = p_2^{II}$$

where

$$p_1 = \frac{c}{8\pi}\int_0^L E_z^* H_x dz; \qquad p_2 = \frac{c}{8\pi}\int_0^L E_z^* H_z dz. \qquad (25)$$

This gives an equation which has two solutions, one of which describes the dispersion properties of a quasi - TE- wave. Further simplification is possible if within the I and II region only the zero-th harmonic is considered, giving the solution for the symmetrical quasi-TE- and quasi- TM-waves. There are 4 references: 3 Soviet-bloc and 1 non-Soviet-bloc. The reference to the English-language publication reads as follows: R.B. Shersby-Harvie, L.B.

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S/109/61/006/010/012/027
D201/D302

Design of rectangular waveguides ...

Mullet, W. WalKinchaw, S. Bell. G. Loach, Proc. I.E.E., 1957, 104B, 273.

SUBMITTED: January 21, 1961

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24.6730

S/057/61/031/007/011/021
B104/B206

AUTHORS: Didenko, A. N. and Vall, A. N.

TITLE: Use of the Kramers method for calculating the particle loss in cyclotrons due to the effect of scattering on betatron oscillations

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 31, no. 7, 1961, 830-833

TEXT: The authors show that the Kramers method, developed for investigating the passage of Brown's particles through a potential barrier, is also suitable for the determination of the portion of lost particles which develops through scattering on betatron oscillations. Kramers method may be applied if the particle loss sets in as a consequence of stochastic forces affecting processes which differ in their physical nature provided that the focusing forces can be described by a potential function of finite height. Since the potential functions describing the phase oscillations in synchrotrons meet these requirements, there is no doubt as to the applicability of Kramers' method for calculating the particle loss caused by

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energy losses. For the potential function of the betatron oscillations B. N. Rodimov (Trudy TPI, 87, 3, 1957) obtained expression

$$V_{MO}=\left(\sqrt{V_{MO}}+\frac{C}{r}\sqrt{\frac{e}{2mc^2}}\right)^2, \qquad (2)$$

which is correct for the nonrelativistic case. $C = \frac{cm}{e} r_o^2\theta_o - r_oA$ is the integration constant and A_o the vector potential of the outer magnetic field. In addition, $V_{MO} = V_{MC}|_{C=O}$:

$$V_{MO}=\frac{\beta E^2}{2em_0c^2}\,\mathrm{ch}^2\left(\sqrt{n_0}\frac{z}{R_0}\right)\left[N_1'\left(\sqrt{n_0}\right)J_1\left(\sqrt{n_0}\frac{r}{R_0}\right)-\right.$$
$$\left.-J_1\left(\sqrt{n_0}\right)\overline{N}_1\left(\sqrt{n_0}\frac{r}{R_0}\right)\right]^2. \qquad (3)$$

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holds. J_1 and N_1 are the Bessel- and Newman functions, E the particle energy, R_o the equilibrium radius, n_o the weakening coefficient of the magnetic field for $r = R_o$, $\beta = v/c$. For the relativistic case, P. A. Cherdantsev (Trudy TPI, 67, 48, 1957) found

$$V=\left[\frac{m_0^2c^4}{e^2}+\left(V_{M0}+\frac{C}{r}\right)^2\right]^{1/2}-\frac{m_0c^2}{e}, \qquad (4)$$

where

$$V_{M0}=\frac{\beta E}{e}\left[N_1'\left(\sqrt{n_0}\right)J_1\left(\sqrt{n_0}\frac{r}{R_0}\right)-\right.$$
$$\left.-J_1'\left(\sqrt{n_0}\right)N_1\left(\sqrt{n_0}\frac{r}{R_0}\right)\right]\mathrm{ch}\left(\sqrt{n_0}\frac{z}{R_0}\right). \qquad (5)$$

From an analysis of the stability range of the betatron oscillations it may be concluded that the Kramers method is applicable for the particle loss due to elastic scattering from the radial betatron oscillations, since the potential function of the betatron oscillations in radial direction has the form of the potential function of an anharmonic oscillator and, thus, a well defined height. With the formula $\frac{1}{N}\frac{dN}{dt} = -\eta\frac{\Delta U}{U_{exc}}\exp(-\Delta U/U_{exc})$ (6) the authors calculated the shares of the lost particles in the case of δ-shaped (C = 0) and uniform (C ≠ 0) distribution of the particles over the chamber cross section. The calculations were made for various μ values; μ was calcualted by

$$\mu = 0.0609091\frac{(m_0c^2)^2}{E_{\text{инж}}}1.25\cdot 10^{-3}E_k\times$$
$$\times\left(\frac{R}{2\sqrt{q}\,a_0}\right)^2 2\pi\frac{1}{\Delta E}. \quad (A)$$

$\eta = \dot{E} / E$ is the attenuation coefficient, $\Delta U/e = (V_{max} - V_{min})$ the height of the potential barrier, $U_{exc} = m\overline{\dot{x}}^2/2$ the excitation energy, and $\overline{\dot{x}}^2$ the square of the mean scattering of the radial velocity, which may be determined according to A. N. Matveyev (Doktorskaya dissertatsiya, MGU, 1959). Figs. 1 and 2 show the results graphically. The dashed lines were obtained according to Matveyev. From a comparison of the results it may be seen that the passage of particles does not exceed 5-10% in the practically important pressure range ($\lesssim 5\cdot 10^{-5}$ mm Hg). The authors thank Professor Doctor A. A. Vorob'yev for his interest. There are 2 figures and 6 references: 4 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki, elektroniki i avtomatiki pri Tomskom politekhnicheskom institute (Scientific Research Institute of Nuclear Physics, Electronics and Automation, Tomsk State Polytechnic Institute). Tomskiy gosudarstvennyy universitet (Tomsk State University)

SUBMITTED: October 19, 1960

Card 5/7

L 16149-63 EWT(1)/EWT(m)/BDS/ES(w)-2 AFFTC/ASD/ESD-3/AFWL/IJP(C)/SSD

ACCESSION NR: AR3005144 Pab-4 S/0058/63/000/006/A039/A039

SOURCE: RZh. Fizika, Abs. 6 A327 68

AUTHORS: Vorob'yev, A. A.; Didenko, A. N.; Kovalenko, Ye. S.

TITLE: Waveguide electronic cyclic accelerator 19

CITED SOURCE: Izv. Tomskogo politekhn. in-ta, v. 100, 1962, 162-169

TOPIC TAGS: accelerator, cyclic, waveguide

TRANSLATION: Results are presented of an investigation of a waveguide cyclic accelerator with external (controlling) magnetic field; the motion of the particles in the common high-frequency field (RZhFiz, 1961, 4B45), the behavior of the waveguide in the alternating magnetic field, the electrodynamics of bent corrugated iris-loaded waveguides (RZhFiz, 1961, 6Zh423; 11Zh383), and similar problems are briefly considered. The high efficiency of such an accelerating system is noted. A. Fateyev.

21

DATE ACQ: 15Jul63 SUB CODE: PH ENCL: 00

Card 1/1

DIDENKO, A.N.; PANOV, Yu.A.

Computation of shunt impedance and quality estimation of two-terminal time-delay ladders. Izv.vys.ucheb.zav.;radiofiz. 5 no.1:187-190 '62. (MIRA 15:5)

1. Tomskiy politekhnicheskiy institut elektroniki i avtomatiki pri Tomskom universitete.
(Electric networks) (Wave guides)
(Impedance (Electricity))

33971
S/089/62/012/003/009/013
B102/B108

24.6730

AUTHORS: Vorob'yev, A. A., Didenko, A. N.

TITLE: Possibility of using "collapsible-whip" slowing-down systems in accelerator engineering

PERIODICAL: Atomnaya energiya, v. 12, no. 3, 1962, 242 - 243

TEXT: The authors (Atomnaya energiya, 8, no. 5, 459 (1960); 10, no. 1, 69 (1961)) have suggested to use closed diaphragm waveguides of square cross section as accelerating systems in large electron synchrotrons. They are far more effective than cavity systems, but they have some disadvantages. The maximum critical wavelength is only about twice the waveguide height. The wavelength cannot be changed without changing the gap. The ratio of the interaction radius a to the wavelength λ has to be large ($a/\lambda \approx 0.5-0.7$); thus, at a phase velocity $\approx c$ the field in the center of the interaction region will become much weaker than the field at the diaphragm. To overcome some of the difficulties, small slowing-down systems operating at long waves are needed, such as collapsible-whip systems. The efficiency of such systems depends on the shunt per unit of length, given by $r_{sh} = E_z^2/P$ for

Card 1/2

travelling waves. E_z is the longitudinal field component. P are the losses per unit of length. Some numerical calculations were carried out for a waveguide system with a "collapsible-whip" slowing-down arrangement as shown in the Fig. The system was designed for TEM-waves with $\lambda \approx 10$ cm. When p = 2.5 cm, q = 0.5 cm, $h_1 = h_2 = 1$cm, a = 2cm, b = 0.2 cm W_1 = 1.893 cm W_2 = 0.473 cm, the zeroth harmonic of a synphased symmetrical TEM-wave will propagate with a phase velocity equal to c and r_{sh} in the center (III) will be 0.155 megohm/cm. For a = 3 cm, r_{sh} will be 0.11 megohm/cm. The power attenuation factor will be $1 \cdot 10^{-4}$cm^{-1} for the zeroth harmonic of a synphased symmetrical TEM-wave (p = 2.5 cm, q = 0.5 cm, a = 2 cm). In this case the power sources may be mounted far from each other. Such stepladder slowing-down systems are apt to increase the wavelength in iron-free systems. There are 1 figure and 3 Soviet references.

SUBMITTED: September 4, 1961

Card 2/2

24670

S/057/62/032/008/005/015
B104/B102

AUTHORS: Didenko, A. N., and Serdyutskiy, V. A.

TITLE: Comparison of Kramer's method with the method of hypergeometric series for calculating particle losses in cyclic accelerators

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 8, 1962, 931 - 933

TEXT: In a previous paper (A. N. Didenko, A. N. Vall, ZhTF, XXXI, no. 7, 1961) it was possible to show that Kramer's approximation method can be used to determine the particle losses caused by scattering from the betatron oscillations. It is now shown that if $z_{max} = y_{max}/\langle y\rangle_{\infty} \geqslant 3$ this method is equivalent to the exact method of the hypergeometric series, $\langle y\rangle_{\infty}$ being the mean vertical oscillation amplitude. Kramer's method can be used to calculate the particle losses, however they may occur. There is 1 figure.

10

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S/057/62/032/008/005/015
B104/B102

Comparison of Kramer's method...

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki, elektroniki i avtomatiki pri Tomskom politekhnicheskom institute (Scientific Research Institute of Nuclear Physics, Electronics and Automation at the Tomsk Polytechnic Institute)

SUBMITTED: June 27, 1961

ACCESSION NR: AR4022440 S/0058/64/000/001/A037/A037

SOURCE: RZh. Fizika, Abs. 1A340

AUTHORS: Didenko, A. N.; Chumakov, A. S.

TITLE: Electron radial and phase oscillations in a synchrotron

CITED SOURCE: Izv. Tomskogo politekhn. in-ta, v. 122, 1962, 61-65

TOPIC TAGS: synchrotron, electron oscillation in synchrotron, electron orbit, electron accelerator, electron phase, electron radius, azimuth dependence, electron radial oscillation, electron phase oscillation

TRANSLATION: An approximate analytic solution is obtained for the equation of radial and phase oscillations in a cyclic accelerator. The dependence of the radius of the instantaneous orbit and of the phase of the particle on the azimuth is expressed in terms of Weierstrass functions. A. Lebedev.

Card 1/1

24 6120

S/057/63/033/001/003/017
B125/B186

AUTHORS: Didenko, A. N., and Kovalenko, Ye. S.

TITLE: The problem of selecting the frequency for an accelerating field of cyclic high-energy electron accelerators

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 33, no. 1, 1963, 28 - 33

TEXT: The difference between the frequency dependence of the shunt resistance R_{sh} in the resonator systems ($R_{sh} \sim f^{\frac{1}{2}}$) and in the wave guide systems ($R_{sh} \sim v^2/P \sim f^{*3/2}$) is reported in this paper. At sufficiently large frequencies, wave guide systems produce higher shunt resistances. This was shown by A. N. Didenko, and Ye. S. Kovalenko (Atomnaya energiya, 10, no. 1, 69, 1961). The solution to the problem is approached in several ways: by changing the dimensions of resonators and the wave guide system with increasing frequencies, by fixating the final electron energy and the radius of the accelerator. This necessitates so changing the coefficient alpha that the optimum frequency equals fundamental oscillation type of the wave

Card 1/2

The problem of selecting ...

S/057/63/033/001/003/017
B125/B186

guide system. Taking the quantum fluctuations of radiation into account, it was found that the optimum frequencies of wave guide systems are greater than those of resonator systems. Numerical results are given for the Cambridge synchrotron. The most important English-language reference is M. Sands (Phys. Rev. 97, 470, 1955).

SUBMITTED: January 29, 1962 (initially)
May 21, 1962 (after revision)

Card 2/2

L 13412-63 BDS

ACCESSION NR: AP3001334 S/0057/63/033/006/0731/0734

47
46

AUTHOR: Didenko, A. N.

TITLE: Cerenkov radiation from charged particles moving in circular orbits in curved rectangular septate waveguides

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 33, no. 6, 1963, 731-734

TOPIC TAGS: electronics, radiation in waveguides, Cerenkov radiation

ABSTRACT: Cerenkov radiation from charged particles moving in a straight diaphragm-type waveguide has been thoroughly investigated. In view of proposals to use the Cerenkov radiation produced in a curved waveguide as a source of radio waves and for other purposes (E.M. Moroz, PTE, No. 1, 16, 1961), it is of interest to obtain information concerning the effect of waveguide curvature on the phenomena involved. In order to obtain such information the author calculates the power transferred to the H sub 01 mode in a rectangular waveguide bent to a ring and provided with a number of thin evenly spaced plane baffles projecting radially inward from the outer wall, by a charged particle moving in a circular orbit within it. The deduced formula can be used to estimate the power obtainable from devices that involve the transfer of energy between field and particle in a curved waveguide. The calculations are performed by expanding the vector potential and

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L 13412-63
ACCESSION NR: AP3001334

the current in normal modes. Maxwell's equations reduce to harmonic oscillator equations for the expansion coefficients of the vector potential, in each of which the corresponding expansion coefficient of the current appears as an inhomogeneous term. A damping term inversely proportional to the Q of the cavity is included. The eigenfunction for the H sub 01 mode, required for obtaining the expansion coefficient of the current, and later for obtaining the field from the solution of the oscillator equation, is written out but is not derived. The current is assumed to be that of a point particle moving uniformly in a circle. The expansion coefficient of the current is found, the oscillator equation is solved, and finally the power transferred is obtained by averaging the reaction of the radiated field on the moving particle. Orig. art. has: 19 formulas and 1 figure.

ASSOCIATION: Nauchno-issledovatel'skiy institut yadernoy fiziki, elektroniki i avtomatiki pri Tomskom politekhnicheskom institute (Scientific Research Institute of Nuclear Physics, Electronics and Automation, Tomsk Polytechnic Institute)

SUBMITTED: 11Jun62 DATE ACQ: 01Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 006 OTHER: 000

Card 2/2

L 25067-65 EWT(1)/EWT(m)/EPA(w)-2/EWA(m)-2/EWA(h) Pab-10/Pt-10/Pi-4/Peb IJP(c)

ACCESSION NR: AR4045746 S/0275/64/000/007/A051/A052 40

SOURCE: Ref. zh. Elektronika i yeye primeneniye. Svodnyy tom, Abs. 7A299 B

AUTHOR: Bezmaternykh, L. N.; Didenko, A. N.

TITLE: Feasibility of using an interdigital delay system in waveguide cyclic accelerators

CITED SOURCE: Sb. Elektron. uskoriteli. M., Vyssh. shkola, 1964, 97-102

TOPIC TAGS: cyclic accelerator, waveguide cyclic accelerator

TRANSLATION: Characteristics of an interdigital delay system and its efficiency in waveguide cyclic accelerators are considered. A dispersion equation is set up whose analysis shows that the system possesses a sufficiently wide passband in the desirable frequency range. A calculation of the shunt resistance per unit length ($r = 0.15$ Mohms/cm) corroborates the possibility of using such a system in the accelerating devices operating at a wavelength of 10 cm and a lead-in height of 3 cm.

SUB CODE: NP, EC ENCL: 00

Card 1/1

ACCESSION NR: AP4041855 S/0139/64/000/003/0144/0150

AUTHOR: Didenko, A. N.; Salivon, Yu. A.

TITLE: Excitation of the coaxial resonator of a waveguide cyclic accelerator

SOURCE: IVUZ. Fizika, no. 3, 1964, 144-150

TOPIC TAGS: cyclic accelerator, waveguide iris, cavity resonator, transverse wave device, slot resonator

ABSTRACT: The authors consider the excitation of a coaxial resonator loaded with diaphragms (Fig. 1 of the Enclosure). The resonator is excited by a half-wave slot cut along the generatrix of the cylindrical outside wall by a tangential field component

ACCESSION NR: AP4041855

$$E_\varphi = U\frac{\delta(r-R_2)}{r}\delta(\varphi-\varphi_0)\sin\kappa\left(z+\frac{l}{2}\right)\cdot e^{-i\omega t},$$

where ℓ is slot length, $k = 2\pi/\lambda$, and R_2 is the outside radius of resonator. Such coaxial resonators are of practical importance in the design of cyclic particle accelerators. The solution is obtained by expanding the electric and magnetic fields in terms of the eigenfunctions of the resonator. The field components for TE oscillations are determined by an impedance approximation, and the method can also be used for excitation by means of a round slot, when TM oscillations are also produced. Expressions for the fields of a smooth coaxial resonator can be obtained by taking the limiting case where $R_2 - R \rightarrow 0$. The Q of the resonator is assumed to be finite. The expressions obtained for the excited fields make it possible to determine the input admittance of the exciting slot and the proper matching between the resonator and the exciting line. Orig. art. has: 1 figure and 16 formulas.

Card 2/4

ACCESSION NR: AP4041855

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S. M. Kirova (Tomsk Polytechnic Institute)

SUBMITTED: 11Jun63	ATD PRESS: 3082	ENCL: 01
SUB CODE: EC, NP	NR REF SOV: 002	OTHER: 001

ACCESSION NR: AP4041855

ENCLOSURE: 01

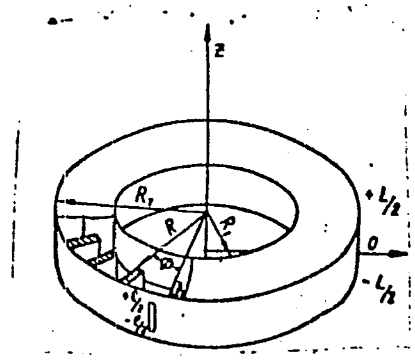

Fig. 1. Coaxial resonator loaded on the generators of its outside cylindrical surface. φ - period of structure.

Card 4/4

L 13078-65 EWT(m)/EPA(w)-2/EWA(m)-2 Pt-10/Pab-10 IJP(c)/SSD/AEDC(a)/
AFETR/AFWL/BSD/ESD(t)

ACCESSION NR: AP4047357 S/0139/64/000/005/0111/0114

AUTHORS: Vorob'yev, A. A.; Didenko, A. N.

TITLE: Development of cyclic waveguide accelerators 19 B

SOURCE: IVUZ. Fizika, no. 5, 1964, 111-114

TOPIC TAGS: particle accelerator, cyclic accelerator, waveguide propagation

ABSTRACT: Several questions connected with the realization of a waveguide accelerator, which was proposed more than 10 years ago by one of the authors (A. A. Vorob'yev, Izv. vuzov SSSR, Elektromekhanika, No. 5, 106, 1958), and which theoretically can result in large energy increments per revolution and consequently a decrease in the acceleration time, are discussed. Principal among these problems are the following: 1. The system is located in the gap of a magnet; this calls for design of economic resonators. 2. The need for

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L 13078-65
ACCESSION NR: AP4047357

larger apertures than in linear waveguide accelerators. 3. Effect of particle dynamics on the presence of all the components of the high-frequency field. 4. Possible type of decelerating system. 5. Solution of the screening problem. 6. Possible advantages of the system over a resonator system. All these questions are discussed and it is concluded that a 10 cm waveguide accelerator system has many theoretical advantages over ordinary resonator systems, and that by means of precision electric spark machining such accelerating systems can be constructed with the required degree of accuracy. It is pointed out that although until recently the Tomsk Polytechnic Institute was the only one in the world doing research on such accelerators, recently the Institute of Vacuum Electronics in Czechoslovakia (J. Datlov et al., Chekhoslovatskiy fizicheskiy zhurnal series B, No. 12, 894, 1962) and the Association of Midwest Universities in the USA (J. Van Bladel, Nuclear Instruments and Methods, v. 14, 101, 1961) have expressed interest in such accelerators. It is stated in the conclusions that the number of groups engaged in

Card 2/3

L 13078-65
ACCESSION NR: AP4047357

the development of waveguide cyclic accelerators will probably increase in the future.

ASSOCIATION: Tomskiy politekhnicheskiy institut imeni S. M. Kirova (Tomsk Polytechnic Institute)

SUBMITTED: 26Nov63 ENCL: 00

SUB CODE: NP, EC NR REF SOV: 004 OTHER: 003

Card 3/3

L 55900-65 EWT(m)/EPA(w)-2/EWA(m)-2 Pab-10/Pt-7 IJP(c)

ACCESSION NR: AP5018365 UR/0139/64/000/006/0016/0020

40
B

AUTHOR: Didenko, A. N.; Grigor'yev, V. P.

TITLE: Effectiveness of smooth decelerating systems of waveguide synchrotrons

SOURCE: IVUZ. Fizika, no. 6, 1964, 16-20

19

TOPIC TAGS: synchroton, waveguide

ABSTRACT: The article concerns the effectiveness of waveguide synchrotrons in which smooth, curved waveguides of rectangular cross section are used for the acceleration. It is shown that under controlled conditions such accelerating systems will be as effective as accelerating systems of a type having diaphragm waveguides and more effective than resonator systems. Orig. art. has 1 figure and 6 formulas.

ASSOCIATION: NII pri Tomskom politekhnicheskom institute imeni S. M. Kirova (NII, Tomsk Polytechnical Institute)

SUBMITTED: 26Jun63 ENCL: 00 SUB CODE: NP, EC

NO REF SOV: 003 OTHER: 000 JPRS

Card 1/1

L 22473-65 EPA(w)-2/EWT(m)/EWA(m)-2 Pt-10/Pab-10 IJP(c)/AFWL/SSD/AEDC(a)/AFETR/ESD(t)

ACCESSION NR: AP5002252 S/0139/64/000/006/0020/0028

AUTHOR: Bulychev, Yu. P.; Didenko, A. N.

TITLE: Motion of particles in a waveguide synchrotron with strong focusing

SOURCE: IVUZ. Fizika, no. 6, 1964, 20-28

TOPIC TAGS: particle acceleration, synchrotron, waveguide synchrotron, strong focusing synchrotron, betatron oscillation, synchrotron oscillation, accelerator stability

ABSTRACT: The authors analyze the motion of particles in a strong-focusing waveguide synchrotron with high frequency field of the LM ($E_z = 0$) type, where the z = 0 plane coincides with the central plane of the accelerator. The conditions under which the equilibrium orbit is circular is calculated on the assumption that the control field is constant in time and that the energy increment of the equilibrium particle is zero. The stability conditions are determined separately for the motion in the z direction and the motion components in the central plane (betatron and synchrotron oscillations). It is shown on the basis of the present

Card 1/2

L 22473-65
ACCESSION NR: AP5002252

analysis and earlier data that in a strong-focusing waveguide synchrotron the betatron oscillations can remain stable if their frequency stays constant within 1% during the time of acceleration. The stability condition for the synchrotron oscillations depends to a lesser degree on the frequency variation, and requires only that the frequency of the synchrotron oscillations be a small quantity. Orig. art. has: 34 formulas.

ASSOCIATION: NII pri Tomskom politekhnicheskom institute imeni S. M. Kirova (Scientific Research Institute, Tomsk Polytechnic Institute)

SUBMITTED: 11Jun63 ENCL: 00 SUB CODE: NP

NR REF SOV: 004 OTHER: 001

Card 2/2

ACCESSION NR: AP4039734 S/0141/64/007/002/0338/0342

AUTHOR: Vorob'yev, A. A.; Bezmaterny*kh, L. N.; Didenko, A. N.; Lisitsy*n, A. I.; Ol'shanskiy, A. P.

TITLE: Laminated dielectric coatings with large reflection coefficients

SOURCE: IVUZ. Radiofizika, v. 7, no. 2, 1964, 338-342

TOPIC TAGS: dielectric coating, reflection coefficient, cavity resonator, microwave equipment, dielectric permittivity

ABSTRACT: In view of various applications of laminated dielectric coating with large reflection coefficients, their reflecting properties are analyzed on the basis of a calculation of the reflection coefficient from a semi-infinite periodic medium, comprising an infinite waveguide of arbitrary cross section, one half of which is filled with dielectric layers. Such a representation neglects the reflection from the second boundary of the layer and is justified at the frequencies considered. The field outside the outermost layer is then described as a sum of incident and reflected waves, and inside the layer by a wave traveling inside the dielectrics. Calculations show that for a given reflection coefficient the dimensions of the laminated coating decrease sharply with increasing dielectric con-

ACCESSION NR: AP4039734

stant of the layers, and in the case of large dielectric constants (e. g., barium titanate), such layers can be used not only in the optical but also in the microwave bands. It is shown that a frequency exists at which the tangential electric field on the surface of the laminated medium vanishes, making it possible in some cases to replace metallic walls of cavity resonators by laminated dielectrics without distorting the field structure in the cavity. Tests of laminated dielectric consisting of alternating layers of paraffin and foamed plastic placed in a rectangular waveguide confirmed this assumption, and the cavity produced by shorting the ends of this waveguide had approximately the same Q as a metal cavity. Slight deviations from theory are explained. The use of dielectrics with large permittivities (10^2 -- 10^3) will make it possible to reduce the total thickness of the sandwich to 1 -- 2 cm in the 10-cm band and to several tenths of a millimeter in the millimeter band. Orig. art. has: 2 figures and 11 formulas.

ASSOCIATION: None

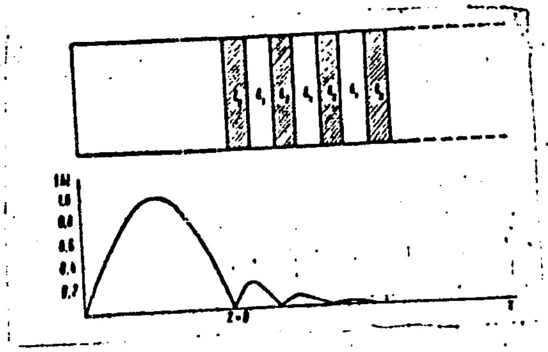
SUBMITTED: 20May63 ENCL: 02

SUB CODE: EM, MT NR REF SOV: 003 OTHER: 04

Card 2/4

ENCLOSURE: 01

ACCESSION NR: AP4039734

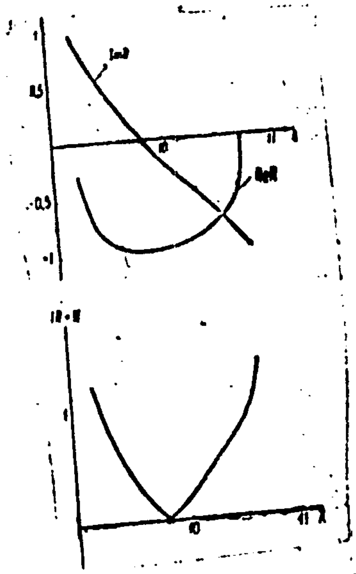


Distribution of electric field in a stratified medium, for $R = 1$, λ = 10 cm, $\varepsilon_2 = 10$, $\varepsilon_1 = 1$, $L_2 = 1.2$ cm (H_{01} mode). (R - reflection coeffic., λ - wavelength, ε - dielectric const., L - thickness)

Card 3/4

ACCESSION NR: AP4039734

ENCLOSURE: 02



Dependence of the reflection coefficient on the wavelength within the rejection band, at $\varepsilon_2 = 2$, $\varepsilon_1 = 1$, $L_2 = 2.8$ cm, $L_1 = 2$ cm, $a = 7.2$ cm (H_{01} mode). (a - width of waveguide)

Card 4/4

DIDENKO, A.N.; GRIGOR'YEV, V.P.

Efficiency of smooth moderating systems of wave-guide synchrotrons. Izv. vys. ucheb. zav.; fiz. 7 no.6:16-20 '64. (MIRA 18:2)

1. Nauchno-issledovatel'skiy institut pri Tomskom politekhnicheskom institute imeni S.M. Kirova.

BULYCHEV, Yu.P.; DIDENKO, A.N.

Motion of particles in a wave-guide synchrotron with strong focusing. Izv. vys. ucheb. zav.; fiz. 7 no.6:20-28 '64. (MIRA 18:2)

1. Nauchno-issledovatel'skiy institut pri Tomskom politekhnicheskom institute imeni S.M. Kirova.

S/0057/64/034/004/0654/0657

ACCESSION NR: AP4028953

AUTHOR: Didenko, A.N.; Salivon, Yu.A.

TITLE: Effect of the bunch on the phase oscillations of the particles in a cyclic waveguide accelerator

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.4, 1964, 654-657

TOPIC TAGS: accelerator, cyclic accelerator, waveguide accelerator, cyclic waveguide accelerator, phase oscillation, phase oscillation stability, accelerator particle bunch radiation

ABSTRACT: The effect of radiation by the charged particles on the phase oscillations in a cyclic waveguide accelerator is discussed theoretically. The waveguide is baffled on the outer curved wall, as shown in Fig.1 of the Enclosure. The particle bunch is assumed to be small compared with the wavelength, and it is treated as a point charge moving only azimuthally. The field is expanded in the TE modes of the waveguide, and the radiation field is derived. It is assumed that only the fundamental H_{01} mode is excited externally. The equation for phase oscillations in the combined radiation and applied fields was derived by the method employed by Ye.S.

Card 1/3

ACCESSION NR: AP4028953

Kovalenko (Izv.VUZov, Fizika,6,85,1959), and the resulting equation is given. [Abstracter's note: Several symbols are left undefined; their definitions are presumably to be found in the reference cited.] The phase oscillation equation is simplified, and the stability of its solutions is discussed. It is concluded, in agreement with fundamental conclusions of A.I.Bary*shev and S.A.Kheyfets (Doklad na IV mezhvuzovskoy konferentsii po elektronny*m uskoritelyam, Tomsk, 1962), that the phase oscillations are quickly damped when a certain parameter is negative, but the longitudinal motion may become unstable under certain conditions when this parameter is positive. Orig.art.has: 13 formulas and 2 figures.

ASSOCIATION: none

SUBMITTED: 14Mar63 DATE ACQ: 28Apr64 ENCL: 01

SUB CODE: PH, SD NR REF SOV: 004 OTHER: 000

Card 2/3

VOROB'YEV, A.A.; DIDENKO, A.N.

Design of wave-guide type cyclic accelerators. Izv. vys. ucheb. zav.; fiz. no.5:111-114 '64. (MIRA 17:11)

1. Tomskiy politekhnicheskiy institut imeni Kirova.

L 15020-65 EWT(m)/EPA(sp)-2/EWA(m)-2 Peb SSD/AEDC(a)/AFWL/BSD/AS(mp)-2/ ASD(p)-3/AFETR/ESD(gs)/ESD(t)
ACCESSION NR: AP4049037 S/0057/64/034/011/1979/1985

AUTHOR: Didenko, A. N.; Salivon, Yu. A.

B

TITLE: On the longitudinal stability of a charged-particle beam circulating in a coaxial finite Q-resonator 19

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 34, no. 11, 1964, 1979-1985

TOPIC TAGS: resonator, cavity resonator, stability criterion, particle accelerator, high energy accelerator, coaxial resonator

ABSTRACT: The problem of the longitudinal stability of an azimuthally homogeneous beam of charged particles has been investigated by A. A. Kolomenskiy and A. N. Lebedev and C. Nielsen, K. Symon and A. Sessler in papers presented at the 1959 CERN International Conference on High-Energy Accelerators and Instruments (and studies published elsewhere) and by L. Laslett, V. K. Neil and A. M. Sessler (Rev. Sci. Instr. v. 32, no. 3, 1961). The last took into account the finite Q of the resonator phenomenologically, but did not go beyond qualitative considerations and did not solve the dispersion equation. There

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ACCESSION NR: AP4049037

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is considered the specific problem of motion of an azimuthally homogeneous particle beam in a coaxial resonator with metal baffles set along the outside wall with large radius is considered in the present paper (see Enclosure 01). The resonator wall conductivity is assumed to be finite, which makes it possible to allow for the finite Q of the cavity. The basic equations are taken from or based on the studies cited above and developed for TE and TM modes. Finally, the dispersion equation is derived. The results of numerical solution of the dispersion equation are presented in graphical form. The plots indicate that the presence of a circulating beam in the resonator leads, in both the subcritical and supercritical energy regions, to "splitting" of the forward wave in the "cold" resonator; the back wave is not affected. In both energy regions there is a p region ($p = n\Omega/\omega$) wherein the solution of the dispersion equation becomes complex. Here a positive imaginary part corresponds to build-up of oscillations in the beam; a negative imaginary part indicates damping. The dependence of the oscillation build-up regions of p (i.e., instability regions) on the energy spread in the beam is plotted for $Q = 1000$ and $Q = \infty$ for the subcritical and supercritical energy regions. These plots indicate that when the energy spread of the beam

L 15020-65
ACCESSION NR: AP4049037

0

is increased the oscillation build-up region (region of possible instability) narrows and shifts toward shorter wavelengths for subcritical energies and towards longer wavelengths for supercritical energies. In the range of excitation frequencies substantially lower than the natural frequencies of the resonator, the deduced condition for longitudinal stability reduces to the inequality obtained by earlier investigators. It is noted that the results of the present work can be extended readily to the case of a finite Q-resonator with smooth inside walls by making the baffle height approach zero. Orig. art. has: 3 figures and 26 formulas.

ASSOCIATION: none

SUBMITTED: 31Mar64 ENCL: 01 SUB CODE: NP, EC

NO REF SOV: 004 OTHER: 003 ATD PRESS: 3143

Card 3/4

L 15020-65
ACCESSION NR: AP4049037

ENCLOSURE: 01

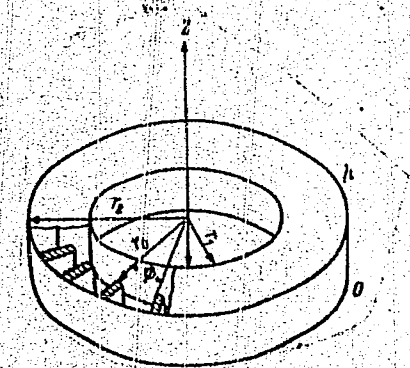

Fig. 1. Diagram of the coaxial finite Q-resonator

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L 3460-66 EWT(m)/EPA(w)-2/EWA(m)-2 IJP(c) DM

ACCESSION NR: AP5016934 UR/0089/65/018/006/0633/0634
621.384.612
53
45
B

AUTHORS: Vorob'yev, A. A.; Didenko, A. N.; Lisitsyn, A. I.; Morozov, B. N.; Potekhin, Yu. I.; Salivon, L. G.; Filatova, R. M.

TITLE: 10 MeV waveguide synchrotron 19

SOURCE: Atomnaya energiya, v. 18, no. 6, 1965, 633-634

TOPIC TAGS: synchrotron, circular accelerator, electron accelerator, high energy accelerator, waveguide

ABSTRACT: After first listing some of the theoretical problems involved in the design of accelerators of this type and dealt with at Institut yadernoy fiziki Tomskogo politekhnicheskogo instituta (Scientific Research Institute of Nuclear Physics of the Tomsk Polytechnic Institute), the authors describe briefly the 10 MeV synchrotron constructed and in operation at this institute since December 1963. The accelerating system is a rectangular waveguide bent in the shape of a ring, loaded with diaphragms on the outer wall. A standing H_{018} mode

L 3460-66

ACCESSION NR: AP5016934

8

in the $\pi/2$ mode is excited in the waveguide. The radius of the equilibrium orbit of the electrons, on which the phase velocity of the H_{018} wave is equal to the velocity of light, is 13 cm. The waveguide interaction space measures 6 x 6 cm. The system Q is approximately 300, the shunt resistance is approximately 0.07 Meg. The electrons are first accelerated to 3 MeV in the betatron mode by a Kerst gun. The high-frequency electromagnetic oscillations are generated by a pulsed 10-cm generator of 5,000 µsec pulses of 400 W each. The operating presure is 2×10^{-5} mm Hg. Several of the control and construction features are briefly described. 'We thank the students of the Tomsk Polytechnic Institute V. I. Zhuravlev, A. M. Voloshin, P. I. Matyazh, A. A. Kushch, and A. N. Pershin, who participated in the adjustment and startup of the installation, and also Ye. S. Kovalenko and A. P. Ol'shanskiy for participating in the development of the accelerator theory, its design, and model test.' Orig. art. has: 1 figure

ASSOCIATION: None

Card 2/3

L 3460-66

ACCESSION NR: AP5016934

0

SUBMITTED: 09Jul64 ENCL: 00 SUB CODE: NP

NR REF SOV: 007 OTHER: 001

BVK

Card 3/3

L 33161-65 EWT(m)/EPA(w)-2/EWA(m)-2 Pt-10/Pab-10 IJP(c)

ACCESSION NR: AP5005231 S/0057/65/035/002/0293/0297

38
B

AUTHOR: Didenko, A.N.; Fomenko, G.P.

TITLE: Influence of beam loading on the shunt resistance of the accelerating system of a cyclic electron accelerator 19

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.2, 1965, 293-297

TOPIC TAGS: cyclic accelerator, synchrotron, linear accelerator, resonator Q factor

ABSTRACT: The influence of beam loading on the operation of a cylindrical resonant electron accelerator is discussed theoretically. The electron beam is assumed to be bunched and the bunches to have negligible dimensions. The field induced by the beam is calculated by expanding in normal modes of the accelerator cavity and an expression is derived for the energy lost by the beam to this field. The Q of the accelerator cavity is expressed in terms of an equivalent shunt resistance, and a formula is derived for the voltage in the accelerating gap in terms of this shunt resistance, the power applied, and the characteristics of the beam. It is found that for a given power and beam characteristics there is an optimum equivalent

Card 1/2

L 33161-65

ACCESSION NR: AP5005231

shunt resistance that produces maximum acceleration. The results are illustrated by calculations relating to the Cambridge Electron Accelerator (CEA-81, 1960). It is found that with a power of 300 kW and a bunch size of 2.8×10^8 particles the optimum equivalent shunt resistance is 300 megohm. The actual equivalent shunt resistance of 120 megohm would be optimal if the bunch size were 4.8×10^8 particles. Orig. art. has: 16 formulas and 1 figure.

ASSOCIATION: none

SUBMITTED: 10Apr64 ENCL: 00 SUB CODE: NP, EM

NR REF SOV: 005 OTHER: 003

Card 2/2

L 33159-65 EWT(m) DIAAP

ACCESSION NR: AP5005232 S/0057/65/035/002/0298/0305

37
36

AUTHOR: Grigor'yev, V. P.; Diderko, A. N.

19 B

TITLE: Cerenkov radiation due to the motion of a particle in a cylindrical resonator located in a focusing magnetic field

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.2, 1965, 298-305

TOPIC TAGS: charged particle, Cerenkov radiation, magnetic field, resonator

ABSTRACT: The authors calculate the radiation of a charged particle moving within a cylindrical resonator located in a focusing magnetic field and executing radial and axial oscillations about an equilibrium circular orbit. The calculation is performed by expanding the field of the moving particle in normal modes of the resonator, retaining only zeroth and first order terms in the ratio of the amplitude of the radial or axial oscillations to the radius of the equilibrium circular orbit, and computing the reaction of the field on the particle. It is found that radiation occurs not only at harmonics of the orbital frequency of the particle but also at linear combinations of these with harmonics of the radial and axial oscillation frequencies. Separate formulas are derived for the power radiated in E waves and H

L 33159-65

ACCESSION NR: AP5005232

waves, respectively. Several limiting cases are discussed, and for a resonator of infinite radius the formula of J.S.Noivik and D.S.Saxon (Phys.Rev.96,180,1954) for the radiation of an electron moving between infinite plane-parallel conducting planes is recovered. Radiation does not occur when the radius of the resonator is small compared with the wavelength. "I express my gratitude to S.P.Kapitsa for discussing certain results of this work." Orig.art.has: 55 formulas.

ASSOCIATION: none

SUBMITTED: 31Jul63 ENCL: 00 SUB CODE: NP,EM

NR REF SOV: 007 OTHER: 002

Card

L 51963-65 EWT(d)/EWT(1)/EEC(k)-2/EEC-4/EEC(t)/EWA(h) Pn-4/Pn-4/Pae-4/
Pg-4/Pt-7/Peb/Pi-4/Pj-4/Pi-4 WS-4
ACCESSION NR: AP5012068 UR/0057/65/035/005/0967/0969

66
65
25 B

AUTHOR: Didenko, A.N.

TITLE: Use of the normal wave method for rectangular septate waveguide calculations

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 5, 1965, 967-969

TOPIC TAGS: waveguide, waveguide iris, waveguide propagation, dispersion equation

ABSTRACT: V.V.Vladimirskiy (ZhTF, 17, 1269, 1277, 1947) has employed a normal wave method to derive the dispersion equation for a septate waveguide of circular section with infinitely thin septa. In the present paper this method is employed to derive the dispersion equation for cophase LE waves in a rectangular septate waveguide, the geometry of which is shown in Figure 1 of the Enclosure. Dispersion equations for antiphase LE waves and LM waves can be similarly derived. The Hertz vector for the LE waves is expanded in a Fourier series in y (see the figure) and Floquet's theorem is applied. Then a rather involved dispersion equation is written in the form of a doubly infinite series. The author asserts that this dispersion equation can be derived by rather cumbersome calculations exactly similar to those employed

Card 1/3

L 51963-65
ACCESSION NR: AP5012068

by Vladimirskiy in the circular case. This dispersion equation is somewhat simplified with the assumption that there are but few septa per wavelength, and a very simple dispersion equation is derived for the case that the openings in the septa are small (i.e., 2g/b 1, see the figure). Ye.S.Kovalenko (no reference given) has derived a similar equation (which reduces to the present equation for small b/b) by an integral equation method. Orig. art. has: 10 formulas and 1 figure.

ASSOCIATION: None

SUBMITTED: 10Oct64 ENCL: 01 SUB CODE: [illegible], EC

NR REF SOV: 002 OTHER: 000

Card 2/3

L 51965-65
ACCESSION NR: AP5012068

ENCLOSURE: 01

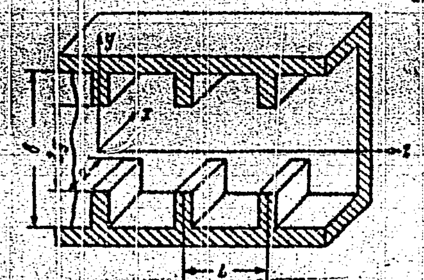

Figure 1. Waveguide geometry

Card 3/3

L 11420-67 EWT(m) IJP(c)

ACC NR: AP6031260 SOURCE CODE: UR/0057/66/036/009/1560/1568

AUTHOR: Didenko, A. N.; Fomenko, G. P.

ORG: None

TITLE: The use of high-frequency fields for focusing particles in cyclic accelerators

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 36, no. 9, 1966, 1560-1568

TOPIC TAGS: particle accelerator, circular accelerator, focusing accelerator, electron optics, alternating electromagnetic field, high frequency, strong focusing

ABSTRACT: The authors discuss the focusing by high-frequency electromagnetic fields of charged particles moving in a toroidal track of circular or rectangular cross section. It is shown that strong focusing can be achieved in a weak-focusing accelerator with the aid of either traveling or standing waves. Conditions for the stability of the motion and expressions for the strength of the focusing are derived. For strong focusing, the high frequency magnetic field must be stronger than the dc guiding field, and focusing is most readily achieved with traveling waves propagating in the direction opposite to that of the motion of the particles. In the calculations for the toroidal track with circular section it was assumed that the high frequency field has the same form as in a straight waveguide of circular section. The equations of motion of a particle in the presence of TE waves reduce for zero wave frequency to those for a

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L 11429-67
ACC NR: AP6031260

particle moving in a p-fold helical field (p is an integral parameter) and, for the values of 2 and 3 of p, to the equations of motion obtained by V.S.Zakharov and M.S. Rabinovich (ZhTF 34, 1986, 1992, 1964) for a charged particle in a double or triple helical field. In the case of a toroidal track of rectangular cross section the high frequency fields in a straight waveguide cannot be employed in the calculations because the curvature of the track lifts the degeneracy of the TE and TM modes. For the rectangular cross section calculations the field is expanded in LE and LM waves, and results analogous to those for the circular cross section case are obtained. In all these calculations it is assumed that the component of the velocity of the particle in the direction of the track is constant. In a final section a criterion for the validity of that assumption is derived and an integral of motion is obtained with the aid of which corrections can be calculated in case the criterion is not met. Orig. art. has: 29 formulas.

SUB CODE: 20/ SUBM DATE: 08Oct65/ ORIG REF: 020/ OTH REF: 004

Card 2/2 bab

ACC NR: AT7003994 SOURCE CODE: UR/0000/66/000/000/0075/0082

AUTHOR: Vorob'yev, A. A.; Bezmaternykh, L. N.; Didenko, A. N.; Filatova, R. M.

ORG: Scientific Research Institute of Nuclear Physics, Electronics, and Automation, Tomsk Polytechnic Institute (Nauchno-issledovatel'skiy institut yadernoy fiziki, elektroniki i avtomatiki pri TPI)

TITLE: Waveguide accelerating systems with walls not shielding the control magnetic field

SOURCE: Mezhvuzovskaya konferentsiya po elektronnym uskoritelyam. 5th, Tomsk, 1964. Elektronnyye uskoriteli (Electron accelerators); trudy konferentsii. Moscow, Atomizdat, 1966, 75-82

TOPIC TAGS: waveguide, ~~accelerator~~, cyclic accelerator, particle acceleration

ABSTRACT: A multilayer-dielectric coating similar to that used in Fabry-Perot interferometers (W. Gulshaw, Proc. Phys. Soc., London, v. 66, sec. B, 597, 1953) and in lasers (J. Franklin Inst., 273, 177, 1962) is proposed for the walls of waveguide-type accelerators. Uniformly bent smooth and septate closed

Card 1/2

ACC NR: AT7003994

rectangular waveguides with multilayer-dielectric walls are theoretically and experimentally investigated. Formulas for the rejection frequency of a periodic multilayer structure, for attenuation, and for the total electromagnetic-wave losses due to reflection from a multilayer dielectric are derived. A length of standard 72 x 34-mm waveguide whose ends were closed by multilayer-dielectric walls was excited by TE_{101} -mode at $\lambda = 10,182$ cm; at room temperature, Q = 1800. Findings: (1) At a fixed frequency, the field structure in the above system does not differ from that in an all-metal system; (2) Use of TE-modes is preferable; inside the multilayer wall, the field attenuates rapidly; with proper selection of wall parameters, no hazard of dielectric breakdown by SHF high power will exist; (3) The above multilayer-dielectric walls are feasible if Sr and Ba titanates are used as materials (see R. O. Bell et al., IRE Trans., MTT-9, 239, 1961). Orig. art. has: 3 figures, 15 formulas, and 1 table.

SUB CODE: 09 / SUBM DATE: 06Mar66 / ORIG REF: 001 / OTH REF: 003

Card 2/2

ACC NR: AP7005707 SOURCE CODE: UR/0089/67/022/001/0003/0006

AUTHOR: Vorob'yev, A. A.; Didenko, A. N.; Ishkov, A. P.; Kolomenskiy, A. A.; Lebedev, A. N.; Yushkov, Yu. G.

ORG: none

TITLE: Investigation of autoresonant method of particle acceleration by electromagnetic waves

SOURCE: Atomnaya energiya, v. 22, no. 1, 1967, 3-6

TOPIC TAGS: particle acceleration, magnetic resonance, acceleration, electron waveguide, electron accelerator, ELECTROMAGNETIC WAVE

ABSTRACT: This is a continuation of earlier work (in: Trudy Mezhdunarodnoy konferentsii po uskoritelyam [Trans. Internat. Conf. on Accelerators] (Dubna, 1963), M., Atomizdat, 1964, p. 1030, and earlier papers) which demonstrated the feasibility of resonant acceleration of particles by a transverse wave in a longitudinal magnetic field under suitable conditions. The present paper contains the results of an experimental investigation of this method of acceleration. In view of the limited possibility of obtaining the required strong field in a large volume, the study is confined to acceleration by 10-cm electromagnetic waves inside a straight smooth waveguide (H_{11} and H_{10} modes). Equations are derived for the angular velocity and phase of a particle accelerated in such a structure, and for the length of the waveguide over which the particle energy will increase. The accelerating system was a

UDC: 621.384.62

ACC NR: AP7005707

rectangular waveguide (72 x 44 mm) for the H_{10} mode or a 76-mm diameter round waveguide for the H_{11} mode. The length of the waveguide ranged from 150 to 1000 mm. Pulsed microwave power (not more than 600 kw) (3000 MHz) was fed in 3-μsec pulses at a repetition frequency of 50 Hz. The 1000-oe dc field was produced with a solenoid. The particle energy was determined from the deceleration produced by aluminum foils and reached 700 kev, at an electric field intensity of 3—5 kv/cm, which is higher than obtainable by ordinary cyclotron acceleration. The ancillary tests made on the equipment are briefly described. The experimental data agree with the earlier theoretical predictions and it is concluded that the autoresonant mechanism can be used for effective injection of particles into magnetic traps. Orig. art. has: 1 figure and 9 formulas. [02]

SUB CODE: 20/ SUBM DATE: 05Sep66/ ORIG REF: 006/ ATD PRESS: 5117

Card 2/2

ROMANKIN, V., komandir podrazdeleniya; DIDENKO, G., komandir samoleta An-2; RKAFOSOV, A., pilot

Is a second pilot for an An-2 airplane needed? Grazhd. av. 21 no.10:21 O '64. (MIRA 18:3)

L 31269-66 EWT(m)/EWP(j) RM

ACC NR: AP6022804 SOURCE CODE: UR/0079/66/036/002/0319/0321

AUTHOR: Nifant'yev, E. Ye.; Tuseyev, A. P.; Markov, S. M.; Didenko, G. F.

41

B

ORG: none

TITLE: Synthesis of ethyleneamidothiophosphites and -phosphonites

SOURCE: Zhurnal obshchey khimii, v. 36, no. 2, 1966, 319-321

TOPIC TAGS: chemical synthesis, organic phosphorus compound, phosphorylation, mercaptan, organic amide, free radical stabilization

ABSTRACT: It was found that tetraethyldiamides of acids of trivalent phosphorus react with beta-aminoethylmercaptan to form previously unknown ethyleneamidothiophosphites and -phosphonites. These conversions were the first examples of phosphorylation of aliphatic mercaptides with amidophosphites and amides of phosphonous acids. The synthesized ethyleneamidothiophosphites and -phosphonites are of interest as inhibitors of free-radical reactions, particularly, those developing in living organisms. Orig. art. has: 1 table. [JPRS]

SUB CODE: 07 / SUBM DATE: 09Jul64 / ORIG REF: 003 / OTH REF: 002

Card 1/1 90 UDC: 547.419.1

0915 0723

DIDENKO, G.G. [Didenko, H.H.]

Changes in the protein fractions of blood serum during heavy muscular loads in partially hepatectomized dogs. Fiziol. zhur. [Ukr] 4 no.6:760-767 N-D '58. (MIRA 12:3)

1. Institut fiziologii im. A.A. Bogomol'tsa AN USSR, laboratoriya vysshey nervnoy deyatel'nosti i troficheskikh funktsiy.
(BLOOD PROTEINS) (LIVER)
(FATIGUE)

DIDENKO, G.G. [Didenko, H.H.]

Mechanism of changes in the protein fractions of the blood serum in dogs during heavy muscular stresses. Fiziol. zhur. [Ukr.] 7 no.4:507-513 Jl-Ag '61. (MIRA 14:7)

1. Laboratory of the Higher Nervous Activity and Trophic Functions of the A.A.Bogomoletz Institute of Physiology of the Academy of Sciences of the Ukrainian S.S.R., Kiyev.
(BLOOD PROTEIN) (EXERCISE)

DIDENKO, G.G. [Dydenko, H.H.]

Changes in the protein fractions of the blood serum in dogs during muscle activity of various intensity. Fiziol. zhur. [Ukr.] 10 no.1:55-60 '64. (MIRA 17:8)

1. Institut fiziologii im. Bogomol'tsa AN UkrSSR, Kiyev.

ACCESSION NR: AT3012857 S/2970/61/000/000/0057/0066

AUTHORS: Zubkova, S. R.; Didenko, I. S.

TITLE: The hyaluronic acid -- hyaluronidase system and its significance in the permeability changes of histo-hematic barriers

SOURCE: Gisto-gematicheskiye bar'yery*: trudy* soveshchaniya, 25-28 maya 1960 g., Moscow, 1961, 57-66

TOPIC TAGS: histo hematic barriers, barrier permeability, hyaluronic acid hyaluronidase system, hyaluronidase inhibitor, activator, cerebrospinal fluid, hyaluronidase system regulators

ABSTRACT: The significance of the hyaluronic acid -- hyaluronidase system in permeability changes of rat histo-hematic barriers caused by ionizing radiation has been studied. The bulk of the evidence obtained favors the assumption that soon after irradiation there is a correlation between permeability changes of the histo-hematic barriers of rats and the change in the non-specific hyaluronidase inhibitor in the blood exists soon after irradiation. In addition to the non-specific hyaluronidase inhibitor localized in the serum, the

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APPROVED FOR RELEASE: 06/12/2000 CIA-RDP86-00513R000410320016-4"

ACCESSION NR: AT3012857

hyaluronic acid -- hyaluronidase system also contains the activators of this enzyme. The activating properties of the serum are masked by the inhibitor and can be discussed only after destruction of the latter by heating to 56°. The activating properties of the serum are due to the presence of a high molecular nondialyzable compound, presumably of protein nature. The cerebrospinal fluid and aqueous humor of the rabbit's eye likewise possess the ability to activate hyaluronidase. Dilution or dialysis of the cerebrospinal fluid result in a loss of this capacity. Hence the activator available in the cerebrospinal fluid seems to be a low molecular compound. The regulators of the hyaluronidase system are apparently of different biological importance. The inhibitor behaves as a protective factor in neutralizing the effect of hyaluronidase apparently owing to the formation of a non-active complex, which is labile in vivo. Activation of hyaluronidase by cerebrospinal fluid and aqueous humor of the eye is probably of local importance. Orig. art. has: 2 figures and 4 tables.

ACCESSION NR: AT3012857

ASSOCIATION: Institut biologicheskoy fiziki AN SSSR, Moscow (Institute of Biological Physics, AN SSSR)

SUBMITTED: 00 DATE ACQ: 12Jul63 ENCL: 00

SUB CODE: BC NO REF SOV: 004 OTHER: 012

Card 3/3

DIDENKO, K.I.

"System of Combustion Process Control in Open-Hearth Furnace," by K. I. Didenko, Priborostroyeniye, No 2, Feb 57, pp 6-9

A system, based on an electronic computer, to control the process of combustion in an open-hearth furnance operating on mixed fuel (coke gas, blast-furnace gas, oil, and oxygen enrichment) has been developed at a plant of the "Energochermet" Trust, and the first variant of such a system was tested at the metallurgical plant imeni Dzerzhinskiy.

The operation of this system is based on application of various computer elements, which calculate the theoretical quantity of air necessary for combustion of fuel and compare it to the actual consumption of oxygen and air On the basis of computed theoretical and actual consumption of air, the proportioning of fuels is controlled automatically. All the measurements and computing operations were carried out with induction transducers of ferrodynamic type. (U)

Sum 1360

DIDENKO, K.I.

25(2) PHASE I BOOK EXPLOITATION SOV/1636

Novyye mashiny; sbornik statey o novykh mashinakh, motorakh, apparatakh sozdannykh na Khar'kovskikh predpriyatiyakh v period 1956-1958 gg. (New Machines; Collection of Articles on New Machines, Motors, and Apparatus Made in Khar'kov Plants From 1956 to 1958) /Khar'kov/ Khar'kovskoye oblastnoye izd-vo, 1958. 226 p. 4,000 copies printed.

Compiler: P.I. Zmaga; Scientific Eds.: V.A. Bulgakov (Chief Engineer, Khar'kov Electromechanical Plant), S.A. Vorob'yev (Candidate of Technical Sciences, Docent), L.A. Shubenko-Shubin (Chief Machine Designer, Khar'kov Turbine Plant, and Corresponding Member, Ukrainian SSR Academy of Sciences); Ed.: Ya.Ye. Donskoy; Tech. Ed.: M.G. Shevchenko.

PURPOSE: This collection of articles is to acquaint the reader with the latest developments and attainments of the Khar'kov machinery manufacturing industry during the 1956-58 period.

COVERAGE: The book, prepared in the form of a descriptive catalog, presents the latest information on machinery and equipment manufactured by Khar'kov plants from 1956-58. A detailed description is given of the following machines and equipment: steam turbines, tractors, self-propelled chassis, diesel engines, diesel locomotives, machine tools including unit metal-cutting machine tools, conveyors, road building machinery, electric power generators, and electrical and electronic instruments. Numerous photographs of the above-listed machinery and equipment are included in the text. No personalities are mentioned. There are no references.

TABLE OF CONTENTS:

Card 2/6

New Machines; Collection of Articles (Cont.) SOV/1636

AVAILABLE: Library of Congress

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JG/ad
6-26-59

11 (4)

SOV/115-59-10-21/29

AUTHORS: Didenko, K.I., Levin, V.M.

TITLE: Measuring Small Mazout Consumptions

PERIODICAL: Izmeritel'naya tekhnika, 1959, Nr 10, pp 51-53 (USSR)

ABSTRACT: With the increasing number of various furnaces in Soviet plants, the consumption of mazout will also sharply increase, especially if one bears in mind the development of Soviet industry anticipated by the Seven Year plan. The amount of liquid fuel produced from petroleum and natural gas amounted to 31% in 1958 of the whole fuel production and will reach 51% in 1965. The consumption of liquid fuel, and particulary that of mazout, must be strictly checked. The khar'kovskiy zavod (Khar'kov Plant) "KIP" constructed a series of mazout piston flowmeters for measuring the consumption of 50 - 250 lit/hour. The plant constructed a small hydromotor with sufficiently smooth motion and torque, which can use a corresponding tachometric head for summing up, teletransmission and indications of instantaneous mazout consumption. This

Card 1/2

SOV/115-59-10-21/29

Measuring Small Mazout Consumptions

hydrometer, which constitutes the basic unit of the flowmeter and the tachometric head are described in detail in the article. There are 2 diagrams, 1 graph and 1 Soviet reference.

Card 2/2

DIDENKO, K.I.

PHASE I BOOK EXPLOITATION SOV/5293

Nauchno-tekhnicheskaya konferentsiya po razvitiyu proizvoditel'nykh sil Khar'kovskogo ekonomicheskogo administrativnogo rayona, 1958.

Voprosy mashinostroyeniya; trudy konferentsii... (Problems of Machine Building; Transactions of the Scientific Technological Conference on the Development of Productive Forces of the Khar'kov Economic Administrative Region) no. 3. Kiyev, Izd-vo AN UkrSSR, 1960. 182 p. 1,500 copies printed.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Sovet po izucheniyu proizvoditel'nykh sil UkrSSR.

Editorial Board: Resp. Ed.: A.A. Vasilenko, Academician of the Academy of Sciences UkrSSR; A.A. Gorshkov, Corresponding Member, Academy of Sciences UkrSSR; I.M. P. nikov, Doctor of Technical Sciences; S.M. Kutsenko; A.I. Adamenko, Candidate of Technical Sciences; G.M. Davydov, Candidate of Economical Sciences; Ed. of Publishing House: S.D. Lepkiy; Tech. Ed.: R.A. Buniy.

PURPOSE: This collection of articles is intended for scientific personnel, engineers, technicians, sovnarkhoz workers, and planning organizations.

COVERAGE: The articles deal with problems in technology and techniques in the manufacture of engines, hydraulic turbines, diesel locomotives, tractors, combines, electrical machinery, etc. Considerable attention is given to the following: the development of various types of equipment used for automation in the coal industry; equipment development for the production and use of rectifiers; the development of new accessories for measuring and controlling heat-engineering parameters; and the introduction of advanced methods into founding and die forging. No personalities are mentioned. References accompany some of the articles. There are 20 references: 16 Soviet, 2 German, 1 French, and 1 English.

Problems of Machine Building (Cont.) SOV/5293

AVAILABLE: Library of Congress

DIDENKO, K.I.

PHASE I BOOK EXPLOITATION SOV/5452

Donskoy, Ya. Ye., G.I. Kardash, and I.P. Lyalyuk, eds.

Mekhanizatsiya i avtomatizatsiya; sbornik statey ob opyte vnedreniya mekhanizatsii i avtomatizatsii na khar'kovskikh mashinostroitel'nykh zavodakh (Mechanization and Automation; Collection of Articles on the Introduction of Mechanization and Automation in Khar'kov Machinery-Manufacturing Plants) [Khar'kov] Khar'kovskoye knizhnoye izd-vo, 1960. 373 p. 3,900 copies printed.

Editorial Board: S.A. Vorob'yev, Candidate of Technical Sciences; Chairman of the Editorial Board: P.I. Zmaga, Engineer; A.A. Kutlov, Engineer, V.I. Kuzubov, Engineer, A. Ye. Leonov, Docent, A.Z. Tupitsyn, Candidate of Technical Sciences, and S.M. Khmara, Candidate of Technical Sciences; Eds.: Ya. Ye. Donskoy, G.I. Kardash, and I.P. Lyalyuk; Tech. Ed.: M.I. Limanova.

PURPOSE: This collection of articles is intended for technical and scientific personnel, outstanding workers, and shock workers of communist labor.

COVERAGE: The multifaceted experience of Khar'kov enterprises in the mechanization, automation, and improvement of manufacturing processes is generalized. The development of new machines, instruments, and production methods is considered and attention is given to newly established enterprises, and to the introduction of telemechanics in the Khar'kov gas-system management. By including concrete examples and facts, the authors of the various articles attempt to demonstrate the achievements of the Khar'kov industrial complex in fulfilling the resolutions of the June (1959) and July (1960) Plenums of the Central Committee of the Communist Party of the Soviet Union. No personalities are mentioned. There are no references.

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PHASE I BOOK EXPLOITATION SOV/5568

Didenko, Konstantin Ivanovich, and Zhemio Aleksandrovna Guseva

Novaya apparatura kontrolya i regulirovaniya (New Monitoring and Regulating Equipment) Moscow, Mashgiz, 1961. 22 p. Errata slip inserted. 12,000 copies printed.

Reviewer: I. Ts. Chervyakovskiy, Engineer; Ed. : L. Ts. Kalika, Engineer; Ed. of Publishing House: M. S. Yeliseyev; Tech. Ed. : G. V. Smirnova; Managing Ed. for Literature on Means of Automation and Instrument Construction: N. V. Pokrovskiy, Engineer.

PURPOSE: This book is intended for technical personnel engaged in designing, assembling and operating monitoring and regulating installations for manufacturing processes. It may also be useful to students in schools of higher technical education and tekhnikums in preparing term or degree projects.

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COVERAGE: The book describes the new models of monitoring and regulating equipment developed at the KIP zavod (Control and Measuring Instruments Plant) of the Khar'kov sovnarkhoz. Operating and design principles are described. The mathematical analysis of instrument and regulator operation and their basic technical characteristics are given. Circuits of external connections and overall dimensions of the equipment are presented. Long-distance communication systems using ferrodynamic pickups, compensated measuring instruments, and electrohydraulic systems of automatic regulation are described. The appendix contains examples of the application of the KIP Plant monitoring and regulating equipment in the metallurgical industry. No personalities are mentioned. There are 20 references, all Soviet.

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AUTHOR: Didenko, K. I., Engineer SOV/119-60-1-3/14

TITLE: A Compensation-Membrane Difmanometer

PERIODICAL: Priborostroyeniye, 1960, Nr 1, pp 9 - 13 (USSR)

ABSTRACT: At the KIP factory of the Khar'kovskiy sovnarkhoz (Khar'kov sovnarkhoz) the manometer of the type DMK, which is described here, was developed. It is intended for the purpose of measuring the pressure and the rate of flow of gases, and covers a total of nine measurement ranges for pressures of between 0 and 160 torr. It meets the requirements of GOST 3720-54, thus belonging to quality class 1. The instrument may be used for measurement in automatic control systems; it was tested at the metallurgicheskiy zavod im. Dzerzhinskogo (Metallurgical Factory imeni Dzerzhinskiy). The instrument works according to the following principle: The pressure difference active on the membrane 1 (Fig 1) transmits an electric signal via corresponding intermediary elements, which, after electronic amplification, is conveyed to a condenser. The deflection of the membrane is equalized by a condenser motor by means of a

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lever system and a spring. In order to obtain the necessary spring pressure acting on the membrane, the motor shaft must be in a certain position corresponding to the prevailing pressure. In a detailed mathematical analysis the author sets up the operator equation (7) for this system and then investigates its characteristics and the stability. These investigations show that the sensitivity of the instrument must be increased. This is attained by a strong counter-coupling of the amplifier according to the speed of the motor (Figs 6 and 7). Thus, the equation (7) is transformed into the equation (15), and, at the same time, the time constant of the motor and the amplification coefficient of the amplifier change. Besides, more stable work of the instrument is warranted. There are 7 figures.

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AUTHOR: Didenko, K. I., Engineer

TITLE: An Apparatus for the Remote Measurement of Heat Engineering Quantities

PERIODICAL: Priborostroyeniye, 1960, No. 8, pp. 15-17

TEXT: At the zavod KIP Khar'kovskogo sovnarkhoza (Factory KIP of the Khar'kov sovnarkhoz), a ferrodynamic transmitter of the type ДФ (DF) was developed. Fig. 1 shows a scheme for remote measurement by using this transmitter. In this circuit, a sensitive element acts upon the coil of the ferrodynamic transmitter I which is located in a magnetic field. The rotation of the coil induces an emf which is proportional to the angle of rotation and is compared for measurement with the emf of another transmitter II. The difference between these two emf is increased and controls the motor of a capacitor. In the present paper, several measuring instruments with ferrodynamic transmitters of this type are described. First, a differential manometer of the type ДКФМ (DKFM) for the measurement of not very high pressure differences (Fig. 3) is described. Here, a bell

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